UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CAREFUSION CORPORATION,

Petitioner,

v.

BAXTER INTERNATIONAL, INC.,

Patent Owner.

Patent No. 5,764,034

Issue Date: June 9, 1998

Title: BATTERY GAUGE FOR A BATTERY OPERATED INFUSION PUMP

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 5,764,034

UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.1-.80 & 42.100-.123

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Attachment A. Proof of Service of the Petition

Attachment B. List of Evidence and Exhibits Relied Upon in Petition

Attachment C. Word Count Compliance Certificate

Petitioner CareFusion Corporation ("CareFusion" or "Petitioner") respectfully petitions for *inter partes* review of claims 1-4 and 9-12 of U.S. Patent No. 5,764,034 ("the '034 patent") (Ex. 1001) in accordance with 35 U.S.C. §§ 311-319 and 37 C.F.R. § 42.100 *et seq*.

I. COMPLIANCE WITH REQUIREMENTS FOR A PETITION FOR *INTER PARTES* REVIEW

A. Grounds for Standing (37 CFR § 42.104 (a))

Petitioner certifies it is not barred or estopped from requesting *inter partes* review of the '034 patent. Neither Petitioner, nor any party in privity with Petitioner, has filed a civil action challenging the validity of any claim of the '034 patent. Petitioner previously filed an *inter partes* review petition with the Board on the '034 Patent (IPR2016-01460); however, there has not been a final decision on that petition.

Petitioner also certifies this petition for *inter partes* review is filed within one year of the date of service of a complaint alleging infringement of a patent. Petitioner was served with a complaint alleging infringement of the '034 patent on or after November 9, 2015, captioned No. 1:15-cv-9986 in the U.S. District Court for the Northern District of Illinois. A copy of Baxter's original Complaint is attached hereto as Ex. 1010.

Because the date of this petition is less than one year from November 9, 2015, this petition complies with 35 U.S.C. § 315(b).

B. Fee for *Inter Partes* Review (37 CFR § 42.15(a))

CareFusion submits payment for this petition through the Board's Patent Review Processing System contemporaneously with the filing of this petition. Please charge any additional fees which may be required in connection with this filing, or credit any overpayment, to Deposit Account No. 06-1910.

C. Mandatory Notices (37 CFR § 42.8(b))

i. Real Party in Interest (37 CFR § 42.8(b)(1))

The real parties in interest for this petition are Petitioner CareFusion Corporation, located at 3750 Torrey View Court, San Diego, California 92130, and/or its corporate parent Becton, Dickinson and Company, located at 1 Becton Drive, Franklin Lakes, New Jersey 07417.

ii. Other Proceedings (37 CFR § 42.8(b)(2))

The '034 patent is the subject of a civil action in the U.S. District Court for the Northern District of Illinois, captioned *Baxter International, Inc. v. CareFusion Corporation and Becton, Dickinson and Company*, No. 1:15-cv-9986 ("the district court lawsuit").

The '034 patent is also the subject of another *inter partes* review proceeding before the Board, assigned case number IPR2016-01460.

iii. Designation of Counsel and Service Information (37 CFR §§ 42.8(b)(3)-(4))

Petitioner identifies the following counsel (a power of attorney accompanies this Petition):

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D. Proof of Service (37 CFR §§ 42.6(e) and 42.105(a))

Proof of service of this Petition is provided in **Attachment A**.

II. INTRODUCTION AND IDENTIFICATION OF THE CLAIMS BEING CHALLENGED (37 CFR § 42.104(B)(1))

This is a petition for *inter partes* review of claims 1-4 and 9-12 of the '034 patent, titled "Battery Gauge for a Battery Operated Infusion Pump," issued on June 9, 1998, to Bowman et al. and assigned to Baxter International, Inc. ("Baxter"). A copy of the '034 patent is included as Exhibit 1001. The '034 patent is generally directed to monitoring and notifying the user of the amount of charge time left on a battery in an infusion pump.

The '034 patent has four independent claims: claims 1, 6, 9, and 13. Claims 1, 6, and 13 are apparatus claims. Claim 9 is a method claim. This challenge is directed at claims 1-4 and 9-12. Claim 1 is representative:

> 1. An infusion pump comprising:
>
> a pump drive mechanism for applying the pumping action to a liquid for infusion in a patent;
>
> a battery for powering the pump drive mechanism;
>
> a circuit which monitors the voltage and current from the battery;
>
> a circuit responsive to the monitoring circuit which determines the remaining time of charge in the battery;
>
> a battery alarm which occurs when the remaining time of charge in the battery is below a predetermined level;
>
> a battery low alert which occurs when the remaining time of charge in the battery is below a predetermined level but above the battery alarm level; and
>
> display means for displaying the remaining time of charge in the battery.

(Ex. 1001, Cl. 1.)

In describing the alleged invention, the specification explains that battery monitoring for infusion pumps was well known:

> While pumps have included battery monitoring capabilities in the past, such monitoring capabilities only measured the available voltage

> from the battery. When the voltage decreased to below a predetermined value, a battery low alert was sounded. When the voltage decreased below a predetermined critical value, a battery alarm sounded.

(Ex. 1001 at 1:54-60.)

The prior art references cited and discussed in this petition are: (1) two patents directed to infusions pumps with battery monitoring functions—one of which belongs to CareFusion's predecessor; (2) a patent directed to a "method and apparatus for determination of battery run-time" for an electronic device; (3) a datasheet for a battery monitoring chip; and (4) a publication directed to battery monitoring.

The first cited patent ("Jenkins") is based on CareFusion's prior art 927 infusion pump, and it is directed to the pump's numerous safety features, such as its battery monitoring and alert functionality. The second cited patent ("Stich") is directed to determining the available run-time on battery power for an electronic device—such as an uninterruptible power system—alarming when the battery run-time falls below a predetermined level, and providing an indication to the user of the available run-time. The third cited patent ("Krohn") is similarly directed to an infusion pump with a battery management circuit that provides indications, alarms, and alerts of the remaining time of battery charge.

The prior art EDN publication is directed to battery monitoring and illustrates the state of the art at the time of the alleged invention. It demonstrates that calculating remaining battery time for a nickel-cadmium ("NiCd") battery using current measurements was well known.

The prior art LTC1325 battery monitoring chip datasheet describes a commercially-available chip that Baxter accuses of providing infringing functionality in the district court lawsuit. (Ex. 1011 at APP0395, 398-404, 408-417, 421-425, 430-435.)

It would have been obvious to one of ordinary skill in the art to combine Stich's battery alert system with the infusion pump described in Jenkins, at least because both inventions are electronic devices featuring monitoring and alarming functionality for similar batteries. It would likewise have been obvious to combine the battery alert systems from Jenkins and Stich with the battery alert system disclosed in Krohn because, it, too, is an invention that specifically focuses on battery monitoring features in an infusion pump system. The remaining references further demonstrate that battery monitoring capabilities were well known for numerous applications, including electronic devices such as infusion pumps which use NiCd or other rechargeable batteries. Because batteries in infusion pumps function in the same manner as rechargeable batteries in other devices, it would have been obvious to a person of ordinary skill in the art to implement the battery run time monitoring features and functionality available for other devices powered by similar batteries in an infusion pump. (*See* Ex. 1003 ¶ 16.)

Thus, the references relied on herein raise a reasonable likelihood that CareFusion will prevail with respect to at least one challenged claim, and CareFusion's petition for *inter partes* review of the '034 patent should be granted.

III. BACKGROUND OF THE '034 PATENT

A. Effective Filing and Priority Dates of the '034 patent

The '034 patent issued from U.S. Application No. 08/630,359, with a filing date of April 10, 1996. The '034 patent does not claim priority to any earlier application. Accordingly, Petitioner states that the priority date for the '034 patent is April 10, 1996, and that the '034 patent expired on April 10, 2016.

B. Prosecution History and Alleged Invention

The file history for the '034 patent is particularly helpful in understanding the narrow grounds of what Baxter claims it invented. A copy of the file history is attached hereto as Exhibit 1002.

During the prosecution, the examiner repeatedly rejected Baxter's application over prior art infusion pumps with battery monitoring circuits and other battery-powered devices that monitored the charge left in the battery. After numerous amendments to the claims in response to obviousness rejections, the only aspect of the '034 patent that the examiner considered inventive was providing low battery alerts and alarms based on "the remaining time of charge" left on the battery, rather than the remaining charge itself, and a specific algorithm for calculating the remaining time of charge.

In the first office action, the examiner explained that prior art "disclose[s] a[n] infusion pump with a battery monitoring circuit" and "teaches...provid[ing] a monitoring circuit with a current measurement (sampling) and remaining charge determination." (Ex. 1002 at APP0132.) As such, "[i]t would have been obvious to one having ordinary skill in the art at the time the invention was made...to provide a[n] infusion pump battery with a remaining capacity indication...." (*Id.*)

To overcome the rejection, Baxter amended its claims and explained that "[t]he voltage of the battery and the current flow from the battery are monitored and utilized as inputs to determine the amount of charge remaining in the battery." (*Id.* at APP0140.) "[T]he process calculates the remaining amphours in the battery [and] utilizes this information to calculate the remaining minutes left in the battery." (*Id.* at APP0141.) The examiner again rejected all pending claims and explained that prior art "teaches...a battery charge evaluator with a voltage monitoring (sampling) circuit (22), current monitoring (sampling) (23) circuit, a microcomputer (16) for determining remaining charge (see the abstract) and a display (34) in figure 1." (*Id.* at APP0150.)

After another amendment to the claims, the examiner once again found the claims obvious in light of the existing state of the art. (*Id.* at APP0163-69.) The examiner explained that

> [It] would have been obvious to one having ordinary skill in the art at the time of invention...to provide the user an indication (an alert) of when the charge of the battery is approaching a level where it will not be able to provide adequate power for the device to function and to further provide an indication of when the charge of the battery has reached the level where it is even nearer to the level where it will not be able to provide adequate power for the device to function.

(*Id.* at APP0169.) Furthermore, the examiner noted that prior art "teaches of a battery monitoring system with a microprocessor which determines the remaining minutes of charge left in the battery." (*Id.* at APP0168.) As such, it would have been obvious to "provide a way to accurately give an indication of the remaining time the battery will be able to provide power to the device." (*Id.*)

To get past the examiner's rejections, Baxter amended its claims and narrowed the alleged invention to an alert and alarm in an infusion pump based on "the remaining time of charge" in the battery, rather than the level of remaining charge itself. (*Id.* at APP0174-175.) The examiner accepted Baxter's argument, and expressly allowed the '034 patent on the limited grounds of such an alert and alarm:

> Prior art of record does not disclose or suggest the battery alarm *when the time of charge left* on a battery is below a predetermined level and a battery low alert which occurs *when the remaining time of charge left* on the battery is below a predetermined level, but above the battery alarm level as claimed in claims 1, 4, and 11 [issued claims 1, 6, and 9]; and a microprocessor functioning to calculate a remaining time of charge *in accordance with the algorithms claimed in claim 24 [issued claim 13]*.

(*Id.* at APP0204) (emphasis added).

In light of the prosecution history alone, there can be no dispute that voltage measurements, current measurements, battery gauges, and low-battery alerts were all well-known before Baxter filed its application. As the examiner recognized, all that is left of Baxter's alleged invention is the alarm and alert based on calculating the "remaining time of charge" from the voltage and current measurements.

C. Person of Ordinary Skill in the Art

A person of ordinary skill in the art ("POSITA") of designing infusion pump battery systems in the 1996 timeframe would have education and research/industry experience in biomedical engineering, with at least 2 years' experience designing hardware, software, and/or firmware for electrical devices in the biomedical industry. (*See* Declaration of Yangming Xu dated November 3, 2016 ("Xu Decl."), attached as Exhibit 1003, ¶ 5.)

D. Ordinary Knowledge of Analog-to-Digital Conversion

By the 1990s, the subject of converting analog signals to digital values was well-known and thoroughly explained in numerous textbooks and publications. For example, the Electronic Analog-to-Digital Converters textbook, by Dieter Seitzer (hereinafter "Seitzer," attached as Ex. 1009) teaches that "the purpose of analog-to-digital conversion [is] to provide the necessary link to digital systems wherever [analog] signals are to be processed, stored, and/or transmitted on a digital medium." (Ex. 1009 at APP0366.) It further notes that "[t]he most popular application of A/D converters is in the field of digital multimeters (DMM), where the magnitude of a voltage, current, or resistance is directly displayed in decimal form." (*Id.* at APP0368.)

Seitzer explains that "while the pointer reading of a voltmeter in an analog representation is continuous, the reading in a digital representation is discrete, i.e. it is limited to a finite set of values (numbers)." (*Id.* at APP0367.) As such, a "sample-and-hold circuit (S/H) must take samples periodically from the analog input signal." (*Id.* at APP0371.) Stated differently, "[d]igital representation of a signal can be considered as replacing a continuous voltage *V*(t) (Fig. 2.1(a)) by a periodical sequence of samples (time quantization) whose amplitudes can assume a limited number of levels (amplitude quantization)." (*Id.* at APP0373.) Below is a "[f]undamental structure for A/D conversion":

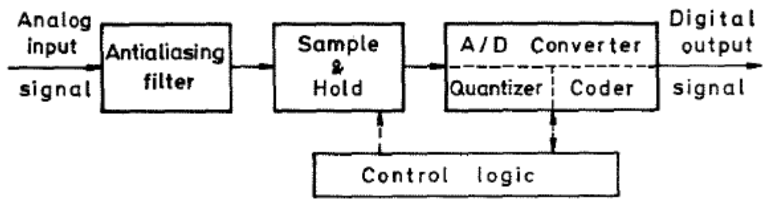


Fig. 1.8 Fundamental structure for A/D conversion

(*Id.* at APP0371.)

Overall, "the function of an A/D converter is to create a discrete signal both in time and amplitude from the originally continuous signal and then to assign the obtained discrete amplitudes to a desired code." (*Id.*)

Seitzer makes clear that even in 1983, A/D conversion was common in computer and electronic devices: "[I]n areas such as instrumentation and process control, A/D conversion has to be carried out on computers. This is now considered to be a conventional or standard type of application." (*Id.* at APP0374.) A diagram for a typical interaction between a microcomputer and an external signal is disclosed:

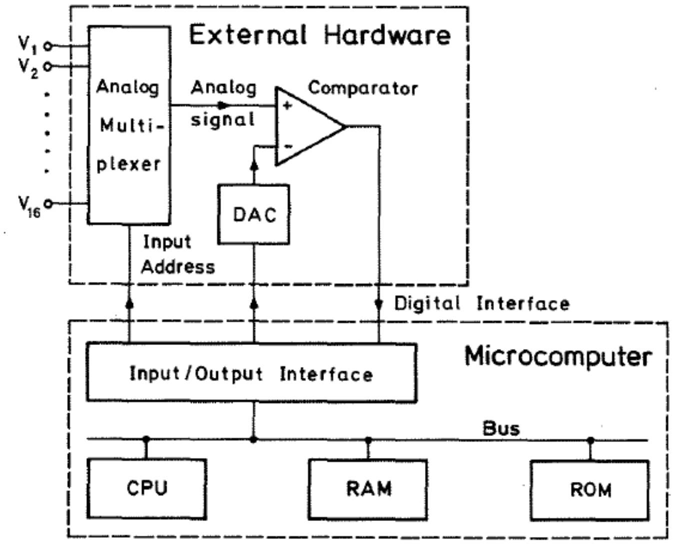


Fig. 3.58 Microcomputer structure extended by external hardware for A/D conversion via standard input/output interface

The figure depicts "a standard microcomputer containing a central processing unit (CPU), a random access memory (RAM), a read-only memory (ROM), and an input/output building block....The ROM stores the software, i.e. the program according to which the conversion is carried out. The read/write memory (RAM) is used to store the results of the A/D conversion. The central processing unit organizes the co-ordination of all units in the system." (*Id.* at APP0374-0375.)

IV. CLAIM CONSTRUCTION (37 CFR § 42.104(B)(3))

In this proceeding, claims must be interpreted in light of the claim construction standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See, e.g., Google Inc. v. CreateAds, LLC*, IPR2014-00200, Paper No. 19, at 2 (July 16, 2014) ("Because the claims of an expired patent are not subject to amendment, the Board's review of such claims applies the principles set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005).").

Claim construction begins with the words of the claims. *Phillips*, 415 F.3d at 1312 ("It is a bedrock principle of patent law that the claims of a patent define the invention to which the patentee is entitled the right to exclude."). "The claims, of course, do not stand alone [and]...must be read in view of the specification, of which they are a part." *Id.* at 1315. "[T]he specification is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term." *Id.* In addition to consulting the specification, the Board "should also consider the patent's prosecution history." *Id.* at 1317.

Unless stated otherwise below, CareFusion contends that each term in the claims should be given its plain and ordinary English meaning.

A. "a circuit responsive to the monitoring circuit"

Claim 1 recites "a circuit which monitors the voltage and current from the battery" and "a circuit responsive to the monitoring circuit which determines the remaining time of charge in the battery."

During prosecution, Baxter twice explained that "[t]he voltage of the battery *and* the current flow from the battery are monitored and *utilized as inputs* to determine the amount of charge remaining in the battery." (Ex. 1002 at APP0140, 0178 (emphasis added).) Similarly, in the district court lawsuit, Baxter has taken the position that "'monitoring circuit means' is easily understood by a person of ordinary skill in the art to refer to the monitoring circuit of claim [1d]," which monitors both voltage and current. (Ex. 1011 at APP0408.) This is consistent with the language in claim 2, which refers to "monitoring circuit means" and requires sampling both "the voltage and the current of the battery." CareFusion agrees that "monitoring circuit" must be understood to mean the circuit in the preceding limitation which "monitors the voltage and current from the battery." (Ex. 1001 at 15:40-41.)

Therefore, the term "a circuit responsive to the monitoring circuit which determines the remaining time of charge in the battery" should be construed as "a circuit that determines the remaining time of charge in the battery based on both the monitored voltage and monitored current."

B. "display means for displaying the remaining time of charge"

Claim 1 recites the limitation of "display means for displaying the remaining time of charge." "It is well settled that a claim limitation that actually uses the word 'means' invokes a rebuttable presumption that § 112, ¶ 6 applies." *Media Rights Techs., Inc. v. Capital One Fin. Corp.*, 800 F.3d 1366, 1371 (Fed. Cir. 2015). As such, "means for displaying the remaining time of charge" should be construed to be a means-plus-function limitation.

"Construction of a means-plus-function limitation includes two steps. 'First, the court must determine the claimed function. Second, the court must identify the corresponding structure in the written description of the patent that performs the function.'" *Noah Sys., Inc. v. Intuit Inc.*, 675 F.3d 1302, 1311 (Fed. Cir. 2012) (quoting *Applied Med. Res. Corp. v. U.S. Surgical Corp.*, 448 F.3d 1324, 1332 (Fed. Cir. 2006) (internal citations omitted)).

In the district court lawsuit, Baxter has taken the position that "the function is displaying the remaining time of charge in the battery [and t]he structure in the '034 Patent specification is an LCD that displays the hours remaining upon request." (Ex. 1011 at APP0407.) CareFusion agrees that the function is "displaying the remaining time of charge in the battery," and the structure disclosed in the '034 patent is an LCD.

C. "means for sampling"

Claim 2 recites the limitation of a "means for sampling the voltage and the current of the battery." (Ex. 1001 at 15:52-53.) As noted above, use of the word "means" creates the presumption that this is a means-plus-function element.

In the district court lawsuit, Baxter argues that "the function is sampling the voltage and the current of the battery [and t]he structure in the '034 Patent is an analog-to-digital converter (202) which samples current or voltage under control of a control circuit (216)." (Ex. 1011 at APP0411.)

Accordingly, the Board should find that the function is sampling the voltage and current of the battery, and the structure disclosed in the ’034 patent is an analog-to-digital converter.

D. “means for alternatively sampling”

Claim 3 recites the limitation of a “means for alternatively sampling the voltage of the battery and the current from the battery.” (Ex. 1001 at 15:54-56.) As noted above, use of the word “means” creates the presumption that this is a means-plus-function element.

In the district court lawsuit, Baxter argues that for this element, “the function is alternatively sampling the voltage of the battery and the current from the battery [and t]he disclosed structure in the ’034 Patent for alternatively sampling is a switch that selects among the inputs (voltage and current), based on the decision of the Control circuit (216).” (Ex. 1011 at APP0416.) Furthermore, Baxter argues that because the LTC1325 chip used in the accused products “contains a single ADC [it] *must* alternatively measure voltage and current.” (*Id.* at APP0414 (emphasis added).)

The Board should accordingly find that the function is alternatively sampling the voltage of the battery and the current from the battery, and the structure disclosed in the ’034 patent is a switch that selects among analog inputs such as voltage and current.

V. IDENTIFICATION OF SPECIFIC STATUTORY GROUNDS FOR CHALLENGE (37 CFR § 42.104(B)(2))

CareFusion respectfully requests cancellation of claims 1-4 and 9-12 of the ’034 patent. The statutory grounds for the challenge are set forth below (all citations are to pre-AIA statutes):

Ground	35 USC §	Claims	References
1	103(a)	1-4 and 9-12	Jenkins (Ex. 1004) in view of Stich (Ex. 1005)
2	103(a)	1-4 and 9-12	Jenkins (Ex. 1004) in view of Stich (Ex. 1005), in further view of Krohn (Ex. 1006)
3	103(a)	1-4 and 9-12	Jenkins (Ex. 1004) in view of Stich (Ex. 1005), in further view of Krohn (Ex. 1006), LTC1325 (Ex. 1008), and EDN (Ex. 1007)

VI. DETAILED EXPLANATION AND EVIDENCE SUPPORTING GROUNDS FOR CHALLENGE (37 CFR §§ 42.104(B)(4)-(5))

A. Ground 1: Obviousness of Claims 1-4 and 9-12 Based on Jenkins, in view of Stich

Claims 1-4 and 9-12 are obvious under 35 U.S.C. § 103(a) in view of Jenkins and Stich.

i. Disclosure of Jenkins

The Jenkins patent (U.S. Patent No. 3,985,133, attached as Ex. 1004) is directed to the safety features of CareFusion’s prior art 927 infusion pump, including battery monitoring and battery notification functionality. (Ex. 1004 at APP0244; Ex. 1003 ¶ 13.) Jenkins issued on October 12, 1976, from U.S. Patent

Application No. 05/473,901. (*Id.* at APP0244.) Accordingly, Jenkins is prior art under at least pre-AIA 35 U.S.C. § 102(b).

Jenkins teaches an infusion pump capable of operating on battery power, which includes numerous circuits for providing safety functions, such as a circuit that monitors the voltage level of the battery and "detects when the voltage level of the battery is below a certain predetermined value." (*Id.* at 18:63-19:15.) When the battery voltage is below a predetermined value, a low battery signal is generated and used to activate a battery alarm indicator. (*Id.* at 18:63-19:32; FIG. 18.) More specifically, the "battery alarm is activated when there is approximately one hour running time remaining on the battery charge." (*Id.* at 8:21-23; *see also id.* at 3:65-68.) If the infusion pump is operated for more than one hour without recharging the battery, there is insufficient power to drive the pump and an occlusion alarm is activated. (*Id.* at 8:25-29.) In addition to the battery alarms and alerts, Jenkins teaches a plurality of "alarm indicators on the front panel and back panel of the pump." (*Id.* at 5:45-48).

As with any infusion pump, Jenkins teaches a pumping mechanism for pumping fluid from a container, through tubing, and into a patient. (*Id.* at 5:18-38.)

ii. Disclosure of Stich

The Stich patent (U.S. Patent No. 5,295,078, attached as Ex. 1005) is directed to a “method and apparatus for determination of battery run-time” in “electrical power systems, and particularly to uninterruptible power supplies or systems which monitor system conditions such as remaining battery run-time.” (Ex. 1005 at 1:2-4, 1:14-17.) Stich issued on March 15, 1994, from U.S. Patent Application No. 07/883,501. (*Id.* at APP0280.) Accordingly, Stich is prior art under at least pre-AIA 35 U.S.C. §102(b).

Stich teaches determining the available run-time on battery power for an electronic device such as an uninterruptible power supply system, alarming when the battery run time falls below a predetermined level, and providing an indication to the user of the available run-time. Specifically, Stich teaches a system from which “the output voltage from the battery is measured directly,” the “[o]utput current supplied to the load is also measured,” and the “remaining run-time available from the battery is then determined in a procedure which utilizes the measured battery voltage, the measured output current...and system specifications[.]” (Ex. 1005 at 3:16-23.) The determination of remaining time of charge is made by a microprocessor circuit. (*Id.* at 6:47-49.) “The resulting estimated run-time may be displayed to an operator or utilized to provide a low run-time indication if the run-time falls below a selected minimum....” (*Id.* at 3:35-

38.) Stich further provides an example formula for determining remaining run-time using calculated sums of instantaneous samples of voltage and current. (*See id.* at 2:32-45.)

iii. Rationale for Combining the Teachings of Jenkins and Stich

A POSITA in the 1996 timeframe would have readily understood the motivation to combine the infusion pump system of Jenkins with the battery alarm and alert features of Stich.

Jenkins and Stich are each directed to electronic devices with battery monitoring functionality. Both devices were specifically designed to warn the user when the remaining time of charge left on the battery ran low. As noted above and demonstrated by Jenkins, infusion pumps are often powered by batteries and have included systems to monitor battery run time since at least 1974.

During the development of a product, it is common for engineers to look to devices with similar features to the device being developed. (Ex. 1003 ¶ 11.) Methods for determining the amount of charge on a battery in a device depend primarily on the characteristics of the battery, rather than the function performed by the product that the battery is powering. (*Id.* ¶ 15.) Because infusion pumps in the 1996 timeframe used common battery types, such as NiCd or NiMH, a POSITA developing battery monitoring functionality in an infusion pump would have looked to other devices that used such batteries. (*Id.*) It would thus have been obvious for a POSITA to incorporate the battery monitor features of Stich into the infusion pump disclosed in Jenkins. Such a combination is merely a substitution of one known element for another to obtain predictable results. *See, e.g.*, M.P.E.P. § 2143. Combining Jenkins and Stich with battery monitoring functionality from other electronic devices would likewise have been obvious "[u]se of [a] known technique to improve similar devices in the same way." *Id.*

iv. <u>Comparison of Claims 1-4 and 9-12 to Jenkins and Stich</u>

The claim chart below specifies where each element of claims 1-4 and 9-12 is met by the Jenkins and Stich combination.

'034 Claim Language	Citations to Jenkins and Stich
1[a]. An infusion pump comprising:	Jenkins is titled "IV Pump" and states as follows: "The present invention is directed to a volumetric infusion pump for use in administering fluids intravenously." (Ex. 1004 at 1:1-3.)
[1b.] a pump drive mechanism for applying the pumping action to a liquid for infusion in a patent;	Jenkins' Abstract explains that the "volumetric infusion pump for intravenous administration of fluid to a patient, includ[es] a volumetric cassette for receiving fluid from an IV fluid container and for pumping such fluid at a controlled rate using an IV administration set until a predetermined volume of fluid has been infused into the patient." Jenkins also describes that a volumetric cassette 24 of the pump receives fluid from a fluid source and delivers the fluid through tubing to a patient for infusion. The volumetric cassette 24 includes a plunger shaft 28, which is driven "to control the flow of fluid into and out of the cassette." (Ex. 1004 at 5:18-38; *see also id.* at 3:10-13 ("[T]he pump is operated to drive the plunger of the cassette to infuse fluid at the preset rate of infusion").)

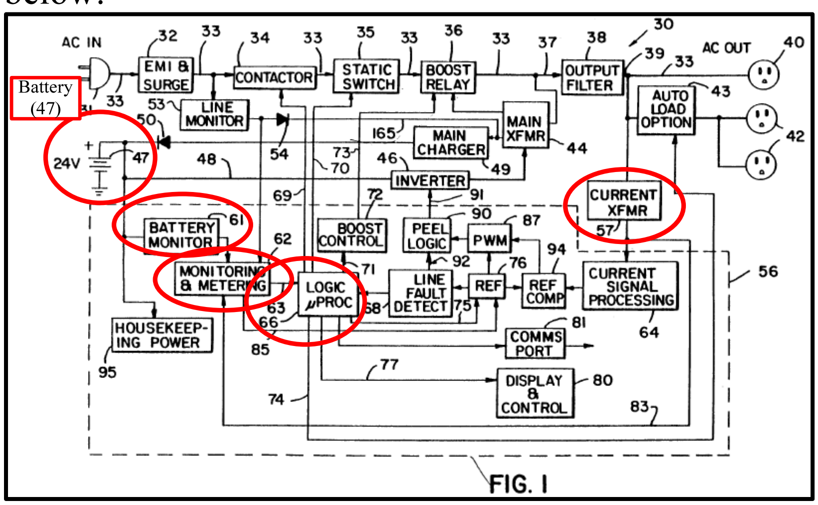
	As further explained, the plunger shuttle 30, which is connected to the plunger shaft 28 and is driven by the motor, provides "vertical movement of the plunger 78 in the volumetric chamber 76 to...pump fluid." (*Id.* at 6:59-64.)
[1c.] a battery for powering the pump drive mechanism;	Jenkins states: "[B]attery 630 is the main source of power for the pump." (Ex. 1004 at 23:1-2; *see also id.* at 6:9 (referencing "the battery used to power the pump").) As explained above, Jenkins describes that the pump operates to drive plunger shaft 28. In addition, Jenkins explains that once the battery is discharged, there is insufficient power to drive the pump. (*Id.* at 4:3-5.)
[1d.] a circuit which monitors the voltage and current from the battery;	Jenkins describes that the pump includes a low battery detector circuit (block N in FIG. 7) that generates "a signal representative of the voltage level of the battery." (*Id.* at 18:63-19:15.) By generating signals representative of the voltage level of the battery, "[t]he low battery detector block N detects when the voltage level of the battery is below a certain predetermined value." (*Id.*) Both voltage and current are analog signals capable of being measured and monitored by the same circuit. (Ex. 1003 ¶ 20.) Furthermore, mathematical relationships between current and voltage, such as Ohm's law have been known to those in the industry for centuries. (*Id.* ¶ 10.) Indeed, engineers designing electronic devices frequently work with and consider voltage and current as two possible input values for calculating the remaining run time of a battery. (*Id.*) It was well known to those in the art in the 1996 timeframe that measuring voltage or current values for a battery-operated device could be used to calculate the run time of the device. (*Id.*) As such, it would have been obvious to a POSITA to monitor the current from the battery in Jenkins as well as the voltage. Furthermore, Stich discloses such a system. For

example:

- Stich is titled "Method and Apparatus for Determination of Battery Run-Time in Uninterruptable Power System."

- It teaches "systems which monitor system conditions such as remaining battery run-time." (Ex. 1005 at 1:16-17.) In particular, Stich states that "the output voltage from the battery is measured directly," the "[o]utput current supplied to the load is also measured," and the "remaining run-time available from the battery is then determined in a procedure which utilizes the measured battery voltage, the measured output current...and system specifications[.]" (*Id.* at 3:16-23.)

- FIG. 1 of Stich illustrates a block diagram of an uninterruptible power system 30, which is annotated below:



- Stich states "a battery monitor 61 is used to monitor the voltage of the battery 47 and to provide a signal to the controller 56 indicating the measured voltage of the battery. The controller 56 includes a metering and monitoring circuit 62 which receives the signals from the battery monitor 61 and the line monitor 53...." (Ex. 1005 at 5:58-64.) The monitoring circuit 62 then sends the signals and information to a microprocessor

	system 66. (*Id.* at 5:66-68.) • Similarly, Stich explains that current transformer 57 monitors current being supplied to a load from the battery 47, which is then sent on to the microprocessor 66. (Ex. 1005 at 5:49-54; 6:18-22.) "The output signal from the current transformer 57 is also provided on a line 83 to the metering and monitoring circuit 62 which provides its signal to the microprocessor on a line 63." (*Id.* at 6:18-22.)
[1e.] a circuit responsive to the monitoring circuit which determines the remaining time of charge in the battery;	As discussed in Section IV(A), the Board should construe "monitoring circuit" as the circuit described in **element 1d.** Jenkins describes that the low battery detector block N generates a low battery signal when the battery voltage level signal indicates that the voltage level of the battery is below a predetermined value. (*Id.* at 18:63-19:15.) The low battery signal is sent to another block P, which functions to provide fault and sensor outputs. (*Id.* at 18:32-36; 18:63-65.) When the low battery signal is received at block P, a battery alarm indicator 48 is activated. (*Id.* at 19:15-32; FIG. 18; *see also id.* at 10:12-18.) Jenkins provides that a battery alarm occurs when the remaining time of charge is below a predetermined level: "battery alarm is activated when there is approximately **<u>one hour running time remaining</u>** on the battery charge." (*Id.* 8:21-23(emphasis added); *see also id.* at 3:65-68.) Stich also discloses this element. For example: • As explained above, Stich discloses that the microprocessor 66 receives from the monitoring and metering circuit 62 voltage and current from the battery 47. (Ex. 1005 at 5:58-64; 6:18-22.) • Stich further states that "the remaining inverter

	runtime available from the battery is determined by the microprocessor 66." (Ex. 1005 at 6:47-49; *see also id.* at 8:36-37 ("The remaining run-time, t_R(LINE) or t_R(INV), is made available by the microprocessor 66.").) Specifically, Stich describes that the run time on battery power is determined by measuring output voltage from the battery, output current from the battery, and system specifications. (*Id.* at 3:18-23; *see also* equation provided at 6:55.)
[1f.] a battery alarm which occurs when the remaining time of charge in the battery is below a predetermined level;	Jenkins discloses multiple battery alarm/alert levels that occur when the remaining time of charge in the battery is below a predetermined level. For example, Jenkins teaches two alarm stages, based on the time remaining on battery charge, as follows: The battery alarm is activated when there is approximately <u>one hour running time remaining</u> on the battery charge. The alarm provides an ouput [sic] indication by the output indicator 48, but the pump continues to operate. If, however, the pump is operated for more than one hour without plugging in the battery charger to recharge the battery, the battery discharges and there is insufficient power to drive the pump which in turn activates the occlusion alarm. (Ex. 1004 at 8:21-29 (emphasis added).) Jenkins also states: A low battery detector circuit represented by block N initially turns on the alarm indicator 48 and for a predetermined period of time, such as an hour, the pump will operate even though indicator 48 represents a low battery. When the battery is discharged and thereby insufficient to drive the pump, then the instrument is turned off and the occulsion [sic] indicator 50 is activated in addition to the indicator 48. Block N therefore detects the

	condition when the battery is low, but still has sufficient power to run the pump and with a low battery alarm indication provided by the indicator 48 and with the pump continuing to operate to administer fluid to a patient. A second stage is reached where the charge on the battery is insufficient to drive the pump and at that time, the occulsion [sic] indicator 50 is additionally activated." (*Id.* at 10:55-11:2.) Jenkins further describes that an audible alarm may be provided in conjunction with any of the indicators. (*Id.* 7:64-8:7.) Additionally, Jenkins provides that block P is capable of "receiv[ing] a plurality of input signals representing various fault and alarm conditions." (*Id.* at 18:32-35.) As such, it would have been obvious to a POSITA to provide additional alarms or alerts which occur when the remaining time of charge in the battery is below other predetermined levels. (Ex. 1003 ¶ 14.) Stich also discloses this element: Stich states that calculated run-time can be "utilized to provide a low run-time indication if the run-time falls below a selected minimum." (Ex. 1005 at 3:35-38; *see also id.* at 8:36-40 (describing "a warning signal automatically provided if the run-time drops below a preselected minimum level").)
[1g.] a battery low alert which occurs when the remaining time of charge in the battery is below a predetermined level but above the	Jenkins states as follows: "[The] battery alarm is activated when there is approximately one hour running time remaining on the battery charge." (Ex. 1004 at 8:22-24.) This battery alarm is also described as activating alarm indicator 48. (*Id.* at 8:21-29; *see also id.* at 10:55-

battery alarm level; and	11:2.) As noted above, it would have been obvious to a POSITA to provide additional alarms or alerts which occur when the remaining time of charge in the battery is below other predetermined levels. Stich likewise teaches a battery indication which occurs when battery run time is below a predetermined level (Ex. 1005 at 3:35-38), and it would have been obvious to a POSITA to provide additional alarms or alerts which occur when the remaining time of charge in the battery is below other predetermined levels. (Ex. 1003 ¶ 14.)
[1h.] display means for displaying the remaining time of charge in the battery.	As noted in Section IV(B), the Board should construe "display means" to be a means-plus-function limitation. Consistent with Baxter's position in the district court lawsuit, the Board should find that the function is displaying the remaining time of charge in the battery, and the structure disclosed in the '034 patent is an LCD. (*See* Ex. 1011 at APP0407.) Stich discloses this element. For example: • Stich describes that the run time determined by measuring output voltage from the battery, output current from the battery, and system specifications "may be displayed to an operator." (Ex. 1005 at 3:35-36.) In particular, Stich states that the remaining run-time "is made available by the microprocessor 66 for display to the user through the user interface 80." (*Id.* 8:36-38.) • Stich also provides that the display can be an LED display. (*Id.* at 6:15.)
2. The infusion pump of claim 1 wherein the monitoring circuit means further includes	As noted in Section IV(C), the Board should construe "means for sampling" to be a means-plus function limitation. Consistent with Baxter's position in the district court lawsuit, the Board should find that the function is sampling the voltage and current of the

means for sampling the voltage and the current of the battery.	battery, and the structure disclosed in the '034 patent is an analog-to-digital converter. (*See* Ex. 1011 at APP0411.) Stich discloses this limitation. For example: • Stich discloses that the monitoring and metering circuit 62 monitors the voltage and current of the battery 47. (Ex. 1005 at 5:58-6:22.) In particular, the battery monitor 61 monitors the voltage of the battery 47 and provides a signal to the metering and monitoring circuit 62 indicating the measured battery voltage. (*Id.* at 5:58-63.) The current transformer 57 monitors the current from the battery and provides a signal to the metering and monitoring circuit 62 indicating the measured battery current. (*Id.* at 6:18-22; *see also* 5:49-54.) The metering and monitoring circuit 62 then sends the measured current and voltage to the microprocessor 66. (*Id.* at 5:66-68, 6:18-22.) • Stich discloses that it was a known prior art technique to "determin[e] available run-time" by performing a "battery test" in which "[t]he power drawn by the load in output watts is calculated as the sum of the instantaneous product of the output <u>voltage</u> and output <u>current</u> over a cycle divided by the number of <u>instantaneous samples</u> acquired for a line cycle." (Ex. 1005 at 2:23-36 (emphasis added).) Thus, Stich discloses that it was known for a battery monitor circuit to sample the instantaneous voltage and current. • Stich describes the circuitry used to calculate the remaining battery run time as follows: The controller 56 functions to monitor the condition of the system and to control its various components in reaction to system conditions. In addition to the line monitor 53 and the current transformer 57, a <u>battery monitor 61 is used to monitor the voltage of</u>

	the battery 47 and to provide a signal to the controller 56 indicating the measured voltage of the battery. The controller 56 includes a metering and monitoring circuit 62 which receives the signals from the battery monitor 61 and the line monitor 53,…[and] a microprocessor system 66, with associated memory and input and output devices, which receives the signals from the monitoring circuit 62….The output signal from the current transformer 57 is also provided on a line 83 to the metering and monitoring circuit 62 which provides its signal to the microprocessor on a line 63. (Ex. 1005 at 5:55-6:22 (emphasis added).) A POSITA would have understood this disclosure as teaching that the battery monitor 61 and metering and monitoring circuit 62 convert analog voltage and current signals into digital signals that can be provided to microprocessor 66 on line 63. Converting analog signals to digital values inherently requires sampling the analog signals. (*See, e.g.*, Ex. 1009 at APP0367, 0371.) At a minimum, it would have been obvious to a POSITA to provide these analog values to the microprocessor by sampling them.
3. The infusion pump of claim 1 wherein the monitoring means further includes means for alternatively sampling the voltage of the battery and the current from the battery.	As noted in Section IV(D), the Board should construe "means for alternatively sampling" to be a means-plus-function limitation. Consistent with Baxter's position in the district court lawsuit, the Board should find that the function is alternatively sampling the voltage of the battery and the current from the battery, and the structure disclosed in the '034 patent is a switch that selects among analog inputs such as voltage and current. (*See* Ex. 1011 at APP0416.) Stich discloses this limitation:

	• As discussed in connection with claim 2, Stich discloses sampling the battery voltage and current with battery monitor 61 and/or metering and monitoring circuit 62 to provide digital signals to microprocessor 66 for calculating the remaining battery run time. Even if such sampling were not expressly disclosed, it would at least have been obvious as discussed above. • Likewise, because the same digital circuit cannot process two signals simultaneously (ex. 1003 ¶ 20), Stich inherently teaches that the metering and monitoring circuit alternates between sampling the voltage signal and the current signal. Even if it were not inherent, it would at most have been an obvious design choice for the metering an monitoring circuit 62 to alternate between sampling the two inputs being fed to it (voltage from battery 47 by way of battery monitor 61 and current from current transformer 57 by way of line 83).
4. The infusion pump of claim 1 further including a battery low alert which occurs when the battery charge is below a predetermined level.	Jenkins describes multiple low battery warnings and alarms that are provided when the remaining time of charge reaches predetermined levels. *See* ***element 1f.*** It would have been obvious to POSITA that any of the visual or audible indicators disclosed by Jenkins as triggered by battery voltage could alternatively be triggered based on battery current. Furthermore, as discussed, Stich discloses a battery indication which occurs when battery run time (and therefore charge) is below a predetermined level. (Ex. 1005 at 3:35-38.)
9[a]. A method of infusing a liquid into a patient comprising:	*See* ***element 1a.***
[9b.] infusing the liquid into the patient by use	*See* ***elements 1b and 1c.***

of an electrically powered mechanism;	
[9c.] powering the electronically powered mechanism with a battery;	*See **element 1c.***
[9d.] monitoring the voltage of the battery;	*See **element 1d.***
[9e.] monitoring the current from the battery;	*See **element 1d.***
[9f.] determining from the voltage and the current the remaining time of charge in the battery;	*See **element 1e.***
[9g.] alarming when the remaining time of charge in battery is below a predetermined level;	*See **element 1f.***
[9h.] alerting when the remaining time of charge in battery is below a predetermined level but above the battery alarm level; and	*See **element 1g.***
[9i.] displaying the remaining time of charge in the battery.	*See **element 1h.***
10. The method of claim 9 wherein the step of monitoring the voltage of the battery	*See **element 2b.***

further includes sampling the voltage of the battery.	
11. The method of claim 10 wherein the step of monitoring the current of the battery further includes sampling the current of the battery.	*See* ***element 2b.***
12. The method of claim 9 further including the step of calculating the remaining minutes of charge left in the battery.	As discussed above in ***element 1e***, Jenkins teaches measuring the battery voltage to calculate when one hour remains on the battery charge. As Baxter asserts, "[t]here is a known correspondence between hours and minutes." (Ex. 1011, APP0435.) As such, it would have been obvious to a POSITA to calculate the remaining minutes from the calculated remaining time of charge in the battery. As explained above in connection with **claim 1**, Stich describes that the microprocessor 66 determines run time available from the battery. Specifically, Stich describes that this determined run-time available from the battery is "usually expressed in minutes." (Ex. 1005 at 6:62-63.)

B. Ground 2: Obviousness of Claims 1-4 and 9-12 Based on Jenkins, in view of Stich, in further view of Krohn

Claims 1-4 and 9-12 are obvious under 35 U.S.C. § 103(a) in view of Jenkins, Stich, and Krohn.

i. Disclosure of Jenkins

The disclosure of Jenkins is discussed in Section VI(A)(i), above.

ii. Disclosure of Stich

The disclosure of Stich is discussed in Section VI(A)(ii), above.

iii. Disclosure of Krohn

The Krohn patent (U.S. Patent No. 5,225,763, attached as Ex. 1006) is directed to "a circuit and method for charging [and monitoring] batteries in a portable electrical or electromechanical device,...such as an ambulatory infusion pump." (Ex. 1006 at 1:17-23.) Krohn issued on July 6, 1993, from U.S. Patent Application No. 07/817,012. (*Id.* at APP0298.) Accordingly, Krohn is prior art under at least pre-AIA 35 U.S.C. §102(b).

Krohn teaches a control circuit which "monitors the present voltage level V_B of the batteries 46" by reading the V_B "through [a]n A/D converter U3." (Ex. 1006 at 4:57-59; 6:30-31.) Krohn explains that "[t]he batteries are connected to an analog to digital (A/D) converter (U3 in FIG. 3), which converts the analog voltage into a stream of serial pulses in an 8-bit binary format and then transmits the stream to the microprocessor." (*Id.* at 4:59-63.) Krohn then discloses using the voltage reading to determine "a 15 minute pumping time after the detection of a low battery or bad battery condition before the microprocessor shuts off the pump." (*Id.* at 7:58-61.) Krohn explains that prior art devices were "equipped with a low battery alarm signal that may be audible or visual or both that indicates to the user that the batteries are nearly depleted and must be recharged promptly."

(Ex. 1006 at 1:30-33.) It further discloses multiple levels of battery alarms and alerts based on predetermined levels of remaining time of charge in the battery, such as an alert with 15 minutes of remaining run time and a final warning when only 20 seconds of run time remain. (*Id.* at 8:10-17.) The alarms and alerts may be accompanied by an audible beeper. (*Id.* at 10:54-59.)

iv. <u>Rationale for Combining the Teachings of Jenkins, Stich, and Krohn</u>

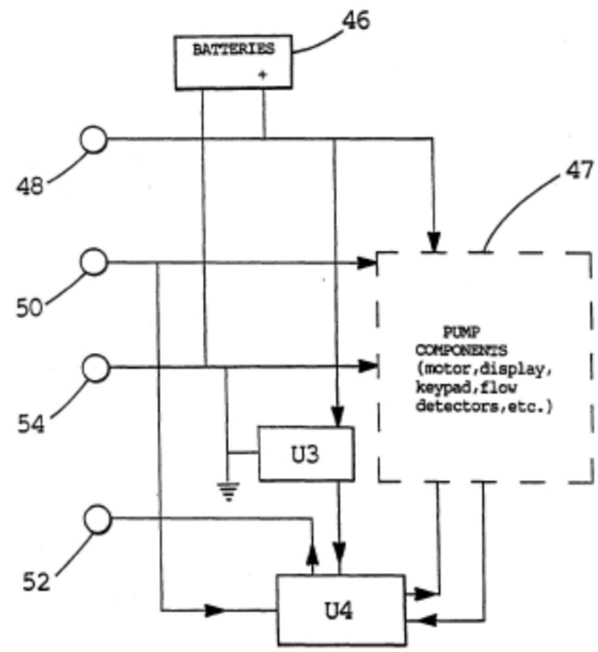
As noted above, a POSITA in the 1996 timeframe would have readily understood the motivation to combine the infusion pump system of Jenkins with the battery alarm and alert features of Stich. Because Krohn is also directed to an infusion pump with battery monitoring and alarming/alerting functionality, a POSITA would have been equally motivated to combine its infusion system with that of Jenkins and Stich. (*See* Ex. 1003 ¶ 19.)

Jenkins and Krohn are both directed to infusion pumps that monitor battery charge and alert the user when the remaining battery run time is low. Stich is directed to an improved battery run time monitoring circuit. As noted above in Section VI(A)(iii), it is common for engineers to look to devices that include similar features and functionality to the device being developed. As such, it would have been obvious for a POSITA to incorporate the battery monitor and alert features of Krohn and Stich into the infusion pump disclosed by Jenkins. Such a combination is merely a substitution of one known element for another to obtain predictable results. *See, e.g.*, M.P.E.P. § 2143.

v. Comparison of Claims 1-4 and 9-12 to Jenkins, Stich, and Krohn

The claim chart below specifies where each element of claims 1-4 and 9-12 is met by the Jenkins, Stich, and Krohn combination.

’034 Claim Language	Citations to Jenkins, Stich, and Krohn
1[a]. An infusion pump comprising:	Jenkins discloses **element 1a** for the reasons discussed in Section VI(A)(iv). Krohn states that the disclosed invention “is illustrated for a medical infusion pump” and “specifically relates to a medical device, such as an ambulatory infusion pump.” (Ex. 1006 at 3:8-9; 1:21-24.)
[1b.] a pump drive mechanism for applying the pumping action to a liquid for infusion in a patent;	Jenkins discloses **element 1b** for the reasons discussed in Section VI(A)(iv). Krohn states that “the motor for the pump” is powered by the battery and is controlled by a microprocessor. (Ex. 1006 at 4:40-43; 4:55-56.)
[1c.] a battery for powering the pump drive mechanism;	Jenkins discloses **element 1c** for the reasons discussed in Section VI(A)(iv). Krohn states that “the batteries 46 [which provide power] are housed within the infusion pump.” (Ex. 1006 at 4:34-35.) The batteries “power the circuitry and motor for the pump.” (*Id.* at 4:55-56).
[1d.] a circuit which monitors the voltage and current from the battery;	Jenkins discloses **element 1d** for the reasons discussed in Section VI(A)(iv). Stich discloses **element 1d** for the reasons discussed in Section VI(A)(iv).

	Krohn states that "[a] control circuit within the device is also provided that monitors if and for how long the device is attached to the base and determines the present capacity of the power source." (Ex. 1006 at 2:43-46.) The battery control circuit is illustrated in FIG. 3:  The control circuit monitors the present voltage level V_B of the batteries 46, which gives an indication of their stored electrical energy capacity. The batteries are connected to an analog to digital (A/D) converter (U3 in FIG. 3), which converts the analog voltage into a stream of serial pulses in an 8-bit binary format and then transmits the stream to the microprocessor U4. (*Id.* at 4:57-63.)
[1e.] a circuit responsive to the monitoring circuit which determines the remaining time of	As discussed in Section IV(A), the Board should construe "monitoring circuit" as the circuit described in **element 1d.** Jenkins discloses **element 1e** for the reasons discussed in

charge in the battery;	Section VI(A)(iv). Stich discloses **element 1e** for the reasons discussed in Section VI(A)(iv). Krohn similarly discloses a "batt15_timer [that]...times a 15 minute pumping time after the detection of a low battery or bad battery condition before the microprocessor shuts off the pump. This allows the user of the pump sufficient time to disconnect the pump from whatever use it is being put to and get it to a charger." (Ex. 1006 at 7:58-63.) The timers are run by the microprocessor circuit (*id.* at 8:49) and "batt15_timer acts like a clock" (*id.* at 10:12). Specifically, "the microprocessor checks the low_battery_flag bit to see if it is set, thereby indicating that the batteries are low" and then resets "register batt15_timer to zero minutes, which allows the pump to run for 15 minutes after the detection of a low battery state before the microprocessor turns the pump off." (*Id.* 9:17-33.) Krohn also provides that the amount of charge time may be considered as a "gas tank for charge to power the pump." (*Id.* at 9:35-39.)
[1f.] a battery alarm which occurs when the remaining time of charge in the battery is below a predetermined level;	Jenkins discloses **element 1f** for the reasons discussed in Section VI(A)(iv). Stich discloses **element 1f** for the reasons discussed in Section VI(A)(iv). Krohn explains that prior art devices were "equipped with a low battery alarm signal that may be audible or visual or both that indicates to the user that the batteries are nearly depleted and must be recharged promptly." (Ex. 1006 at 1:30-33.) Krohn discloses an infusion pump with multiple levels of battery alarms and alerts based on predetermined levels of remaining time of charge in the battery. For example, Krohn provides that "if the value of batt15_timer is less

	than 14 minutes and 40 seconds and the low battery condition has been detected..., the program will give a low battery warning message until acknowledged by the pump user." (Ex. 1006 at 8:10-14.) Furthermore, "[w]hen the batt15_timer has the value of 14 minutes and 40 seconds, a final 20 second warning message is given before the pump is shut off." (*Id.* at 8:14-17.) "[T]he program will continue to loop every half second while displaying the 20 second low battery message or the 10 second bad battery or dead battery message." (*Id.* at 11:55-58.) Similarly, Krohn discloses an alarm for "a 10 second bad battery error message to be displayed [by] the microprocessor" when the pump detects a bad or dead battery. (*Id.* at 8:1-7.) The alarms or alerts may be accompanied by an "audible beeper" or "audible alarm to sound at full volume." (*Id.* at 10:54-59; *see also id.* at 18:41-44 (a low battery alarm will cause an "audible alarm...at low volume").
[1g.] a battery low alert which occurs when the remaining time of charge in the battery is below a predetermined level but above the battery alarm level; and	Jenkins discloses **element 1g** for the reasons discussed in Section VI(A)(iv). Stich discloses **element 1g** for the reasons discussed in Section VI(A)(iv). Krohn discloses an infusion pump with multiple levels of battery alarms and alerts, as discussed in connection with **element 1f**.
[1h.] display means for displaying the remaining time of charge in the battery.	As noted in Section IV(B), the Board should construe "display means" to be a means-plus-function limitation. Consistent with Baxter's position in the district court lawsuit, the Board should find that the function is displaying the remaining time of charge in the battery, and the structure disclosed in the '034 patent is an LCD. (*See* Ex. 1011 at APP0407.) Stich discloses **element 1h** for the reasons discussed in

	Section VI(A)(iv). Krohn's infusion pump includes an LED display. (Ex. 1006 at 8:47-48; FIG. 3; *see id.* at 18:5.) Furthermore, Krohn explains that the infusion pump "will direct a 10 second bad battery error message to be displayed before the microprocessor shuts itself and the pump down." (Ex. 1006 at 8:4-6.) Similarly, the infusion pump will display "a final 20 second warning message." (*Id.* at 8:15-16.) Thus, Krohn discloses a "low battery display [to be] displayed on the display of the pump." (*Id.* at 19:36-37.)
2. The infusion pump of claim 1 wherein the monitoring circuit means further includes means for sampling the voltage and the current of the battery.	As noted in Section IV(C), the Board should construe "means for sampling" to be a means-plus-function limitation. Consistent with Baxter's position in the district court lawsuit, the Board should find that the function is sampling the voltage and current of the battery, and the structure disclosed in the '034 patent is an analog-to-digital converter. (*See* Ex. 1011 at APP0411.) Stich discloses the elements of **claim 2** for the reasons discussed in Section VI(A)(iv). Krohn states that "[t]he batteries are connected to an analog to digital (A/D) converter (U3 in FIG. 3), which converts the analog voltage into a stream of serial pulses in an 8-bit binary format and then transmits the stream to the microprocessor." (Ex. 1006 at 4:59-63.) Specifically, Krohn describes that "the battery voltage V_B is read through the A/D converter U3 and written to register v_batt." (*Id.* at 6:30-33.) A POSITA would have understood this disclosure as teaching that the analog voltage signal read by the A/D is converted to a digital signal. Converting analog signals to digital values with an A/D converter inherently requires sampling the analog signals. (*See, e.g.*, Ex. 1009 at APP0367, 0371.) At a minimum, it would have been obvious to a POSITA to

	provide these analog values to the processor by sampling them.
3. The infusion pump of claim 1 wherein the monitoring means further includes means for alternatively sampling the voltage of the battery and the current from the battery.	As noted in Section IV(D), the Board should construe "means for alternatively sampling" to be a means-plus-function limitation. Consistent with Baxter's position in the district court lawsuit, the Board should find that the function is alternatively sampling the voltage of the battery and the current from the battery, and the structure disclosed in the '034 patent is a switch that selects among analog inputs such as voltage and current. (*See* Ex. 1011 at APP0416.) Stich discloses the limitations of **claim 3** for the reasons discussed in Section VI(A)(iv). As explained above in connection with claim 2, Krohn discloses sampling the battery voltage to provide digital signals for determining the remaining battery run time. In combining Krohn with the teachings of Stich, it would have been obvious to a POSITA to alternatively sample the voltage and current with the A/D converter.
4. The infusion pump of claim 1 further including a battery low alert which occurs when the battery charge is below a predetermined level.	Jenkins discloses the elements of **claim 4** for the reasons discussed in Section VI(A)(iv). Stich discloses the elements of **claim 4** for the reasons discussed in Section VI(A)(iv). Krohn discloses an infusion pump with a battery low alert, as discussed in connection with **element 1f**. Krohn further provides that if the voltage of the battery is "less than 2.6 v, this indicates a bad battery is present" and the bad battery flag is set. (Ex. 1006 at 6:66-68.) Similarly, Krohn provides that "[i]f the battery voltage, V_B, is below the threshold of 3.20 v" the dead battery flag is set. (*Id.* at 7:41-44.) Krohn then states that when there has been "a bad or dead battery error detection, the program will direct a 10 second bad battery error message to be displayed before the microprocessor shuts itself and the pump down."

	(Ex. 1006 at 8:1-6.)
9[a]. A method of infusing a liquid into a patient comprising:	*See* ***element 1a***.
[9b.] infusing the liquid into the patient by use of an electrically powered mechanism;	*See* ***elements 1b and 1c***.
[9c.] powering the electronically powered mechanism with a battery;	*See* ***element 1c***.
[9d.] monitoring the voltage of the battery;	*See* ***element 1d***.
[9e.] monitoring the current from the battery;	*See* ***element 1d***.
[9f.] determining from the voltage and the current the remaining time of charge in the battery;	*See* ***element 1e***.
[9g.] alarming when the remaining time of charge in battery is below a predetermined level;	*See* ***element 1f***.
[9h.] alerting when the remaining time of charge in battery is below a predetermined level but above the battery alarm level; and	*See* ***element 1g***.

[9i.] displaying the remaining time of charge in the battery.	*See* ***element 1h***.
10. The method of claim 9 wherein the step of monitoring the voltage of the battery further includes sampling the voltage of the battery.	*See* ***element 2b***.
11. The method of claim 10 wherein the step of monitoring the current of the battery further includes sampling the current of the battery.	*See* ***element 2b***.
12. The method of claim 9 further including the step of calculating the remaining minutes of charge left in the battery.	Jenkins and Stich disclose the elements of **claim 12** for the reasons discussed in Section VI(A)(iv). As explained above in connection with **claim 1**, Krohn teaches that the microprocessor "control circuit" determines the remaining minutes of charge left in the battery. (*See, e.g.*, Ex. 1006 at 7:58-63; 8:10-17.)

C. Ground 3: Obviousness of Claims 1-4 and 9-12 Based on Jenkins, in view of Stich, in further view of Krohn, the LTC1325 datasheet, and the EDN Publication

Claims 1-4 and 9-12 are obvious under 35 U.S.C. § 103(a) in view of Jenkins, Stich, Krohn, the LTC1325 datasheet, and the EDN Publication.

i. Disclosure of Jenkins

The disclosure of Jenkins is discussed in Section VI(A)(i), above.

ii. Disclosure of Stich

The disclosure of Stich is discussed in Section VI(A)(ii), above.

iii. Disclosure of Krohn

The disclosure of Krohn is discussed in Section VI(B)(iii), above.

iv. Disclosure of the LTC1325 datasheet

In the district court lawsuit, Baxter relied on the datasheet of the commercially-available LTC1325 chip ("LTC1325," attached as Ex. 1008), which is a component of the accused product to satisfy numerous claim limitations challenged in this Petition. (Ex. 1011 at APP0395, 398-404, 408-417, 421-425, 430-435.) LTC1325 describes an integrated circuit that provides battery monitoring functionality. (Ex. 1008.) The LTC1325 chip is "an integrated battery management system" that "allows the total charge leaving the battery to be calculated." (*Id.* at APP0338.) It measures "the average voltage across [a] sense resistor...to determine the average battery load current," and through its integrated analog-to-digital converter allows a microprocessor to "accumulate the ADC measurements and do a time average to determine the total charge leaving the battery." (*Id.* at APP0352.)

LTC1325 has a copyright date of 1994. The accuracy of that date is corroborated by an article about the LTC1325 chip appearing in the October 1994 issue of Linear Technology Magazine. (Ex. 1013 at APP0812-14; *see also* Ex. 1003 ¶ 8.) The accuracy of the LTC1325 copyright date is further corroborated by a reference to the commercial LTC1325 chip as "smart battery technology" containing "a gas gauge and charge controller" in the March 2, 1995, issue of EDN. (Ex. 1014 at APP0494; *see also* Ex. 1003 ¶ 8.) Accordingly, LTC1325 is prior art under at least pre-AIA 35 U.S.C. § 102(b).

v. Disclosure of the EDN Publication

The May 26, 1994, issue of EDN ("EDN," excerpts attached as Ex. 1007) teaches that battery-energy gauges for various electronic devices were well known in the art at the time of the alleged invention. (Ex. 1007 at APP0333.) Such gauges would "monitor the amount of energy that flows into and out of a battery to make accurate estimates of the amount of charge remaining." (*Id.*) The estimate was "available not only to the user, via an on-pack display, but also to the battery-run device, via some sort of serial data link." (*Id.*)

EDN specifically identified the issue of unreliable and inaccurate results for battery monitoring through voltage measurements only, as was described in the '034 patent. (*Compare* Ex. 1001 at 1:54-60, *with* Ex. 1007 at APP0333 ("[S]ome manufacturers have marketed crude energy gauges that use this approach. The results are woefully unreliable[.]").) EDN then explains that "[t]he only accurate way to know how much charge is actually in a battery pack is to count the coulombs as they come and go" and that such "highly accurate gauges are now available":

> A simplistic way of viewing a rechargeable battery is as a tank of electrons. As the charge depletes, the tank drains. As it recharges, the tank fills. To know how full the tank is, you need to count the electrons as they go into the empty tank. If the size of the tank is also known, you can make an estimate of "percent full."
>
> Electrical current is a measure of electron flow, where $1A = 1.6 \times 10^{19}$ electrons/sec. To count electrons, the energy gauge must monitor battery current and then numerically integrate it over time. This process requires three elements of hardware to implement: a current-sensing device, an A/D converter, and a processor to perform the integration and send the results to the host....
>
> By far, the least expensive and most common approach for current sensing is to insert a low-value resistor in series with the current path and measure the voltage drop across it....
>
> An A/D converter measures the voltage across the current-sensing resistor.... After conversion to digital form, it is relatively easy to numerically integrate the readings with a [microprocessor].

(*Id.* at APP0333-334.) The gauge can then display the information on an LCD or provide it to the device through a serial link, which could be used for "instantaneous readings [or] multiple levels of low-battery warning." (*Id.* at APP0336.)

EDN has a publication date of May 26, 1994. Accordingly, EDN is prior art under at least pre-AIA 35 U.S.C. § 102(b).

vi. Rationale for Combining the Teachings of Jenkins, Stich, Krohn, LTC1325, and EDN

As noted above, a POSITA in the 1996 timeframe would have readily understood the motivation to combine the infusion pump system of Jenkins with the specific alarm and alert features of Krohn and Stich. A POSITA would likewise have understood the motivation to combine the infusion pump of Jenkins, Krohn, and Stich with the battery monitoring functionality and features disclosed in LTC1325 and EDN. (Ex. 1003 ¶ 19.)

First, well-known methods for calculating the capacity of a battery by integrating current over time have existed since at least the late 19th century. (Ex. 1003 ¶ 6; *see also* Ex. 1012 at APP0443.) So-called "coulomb counting" as taught in LTC1325 and EDN would thus have been a basic part of a POSITA's background knowledge. (Ex. 1003 ¶ 6.)

Second, the commercially-available LTC1325 chip was specifically designed as a "drop in" solution for battery monitoring functionality that could be combined with a circuit in a microprocessor-controlled device. (*See* Ex. 1013 at APP0462-464; Ex. 1003 ¶ 8.) The fact that CareFusion actually included the

LTC1325 chip in the accused products is further evidence of the motivation to use LTC1325 for its intended purpose in an infusion pump. (*See id.*)

Furthermore, because rechargeable batteries are not unique to infusion pumps, it would have been obvious for a POSITA to combine teachings for battery monitors in other electronic devices with the battery system of an infusion pump. (Ex. 1003 ¶ 16.) For example, EDN explains the unreliability of voltage for measuring remaining run time in NiCd batteries, which were common for both infusion pumps and other contemporary electronics. (Ex. 1007 at APP0333.) It was known in the art that "highly accurate gauges" depended on counting the coulombs by integrating the battery current over time. (*Id.* at APP0334.) Indeed, during the prosecution of the '034 patent, the examiner expressly found that a POSITA would have looked to battery monitors for devices other than infusion pumps: "The fact that the battery of Codd is used to power a motor of a car is irrelevant in light of the fact that the claims do not recite a limitation which would indicate that the charging of the battery is load specific." (Ex. 1002 at APP0152.)

Thus, it would have been obvious to a POSITA during the relevant timeframe to combine Jenkins, Krohn, and Stich with the battery monitoring functionality of LTC1325 and EDN. Such a combination is merely "combining prior art elements according to known methods to yield predictable results." *See, e.g.*, M.P.E.P. § 2143.

vii. Comparison of Claims 1-4 and 9-12 to Jenkins, Stich, Krohn, LTC1325, and EDN

The claim chart below specifies where each element of claims 1-4 and 9-12 is met by Jenkins, Stich, Krohn, LTC1325, and EDN.

'034 Claim Language	Citations to Jenkins, Stich, Krohn, the LTC1325 datasheet, and the EDN Publication
1[a]. An infusion pump comprising:	Jenkins discloses **element 1a** for the reasons discussed in Section VI(A)(iv). Krohn discloses **element 1a** for the reasons discussed in Section VI(B)(v).
[1b.] a pump drive mechanism for applying the pumping action to a liquid for infusion in a patent;	Jenkins discloses **element 1b** for the reasons discussed in Section VI(A)(iv). Krohn discloses **element 1b** for the reasons discussed in Section VI(B)(v).
[1c.] a battery for powering the pump drive mechanism;	Jenkins discloses **element 1c** for the reasons discussed in Section VI(A)(iv). Krohn discloses **element 1c** for the reasons discussed in Section VI(B)(v).
[1d.] a circuit which monitors the voltage and current from the battery;	Jenkins discloses **element 1d** for the reasons discussed in Section VI(A)(iv). Stich discloses **element 1d** for the reasons discussed in Section VI(A)(iv). Krohn discloses **element 1d** for the reasons discussed in Section VI(B)(v). In the district court lawsuit, Baxter has taken the position that this claim limitation is met by the LTC1325 chip. (Ex. 1011 at APP0395, 0398-0404.) To the extent that these features of the LTC1325 chip fall

	within Baxter's claims, this claim limitation is disclosed or at least rendered obvious by LTC1325. For example, under its list of "Features," LTC1325 states that the chip "Measures Battery Voltage, Battery Temperature and Ambient Temperature with Internal 10-Bit ADC" (Ex. 1008 at APP0338.) LTC1325 also states that "the average voltage across the sense resistor can be measured to determine the average battery load current." (*Id.* at APP0352.) Similarly, it explains that "the average discharge current through the battery may be measured and the total charge leaving the battery calculated." (*Id.* at APP0343.) EDN explains that monitoring of voltage and current can be through "fully assembled modules" of circuits or "single ICs that require additional circuitry." (Ex. 1007 at APP0336.) Such circuits were known to be able to monitor "terminal voltage, either open circuit or under load," and "monitor battery current." (*Id.* at APP0333-034.) Specifically, "[a]n A/D converter [could] measure[] the voltage across the current-sensing resistor." (*Id.* at APP0334.) EDN also notes that battery information "may include instantaneous readings of voltage [and] current." (*Id.* at APP0336.)
[1e.] a circuit responsive to the monitoring circuit which determines the remaining time of charge in the battery;	As discussed in Section IV(A), the Board should construe "monitoring circuit" as the circuit described in **element 1d.** Jenkins discloses **element 1e** for the reasons discussed in Section VI(A)(iv). Stich discloses **element 1e** for the reasons discussed in Section VI(A)(iv). Krohn discloses **element 1e** for the reasons discussed in Section VI(B)(v). In the district court lawsuit, Baxter asserted that LTC1325 "indicates that calculating the time remaining" can be done by an accompanying microprocessor. (Ex.

<table>
<tr><td></td><td>1011 at APP0403.) For example, LTC1325 provides that the chip can measure the average voltage across the sense resistor and that a "microprocessor can then accumulate the ADC measurements and do a time average to determine the total charge leaving the battery." (See Ex. 1008 at APP0352.)

EDN provides that the circuit noted above ("energy gauge") can "tell you exactly how much [battery] charge remains available for use." (Ex. 1007 at APP0333.) Specifically, it explains that terminal voltage can be monitored and "translate[d]...into a measure of remaining charge." (Id.) Similarly, it explains that the battery-energy gauge can "monitor battery current and then numerically integrate it over time" to "count electrons" to determine the amount of charge in the battery (i.e., "know how full the tank is"). (Id. at APP0334.) It further discloses a particular way to do so:

By far, the least expensive and most common approach for current sensing is to insert a low-value resistor in series with the current path and measure the voltage drop across it....An A/D converter measures the voltage across the current-sensing resistor....After conversion to digital form, it is relatively easy to numerically integrate the readings with a [microprocessor].

(Id. at APP0334.)

To the extent that EDN does not expressly disclose converting the remaining charge into the remaining time of charge, it would have been obvious to a person of ordinary skill in the art. (See Ex. 1003 ¶ 21.)</td></tr>
<tr><td>[1f.] a battery alarm which occurs when the remaining time of charge in the battery is below a predetermined</td><td>Jenkins discloses element 1f for the reasons discussed in Section VI(A)(iv).

Stich discloses element 1f for the reasons discussed in Section VI(A)(iv).

Krohn discloses element 1f for the reasons discussed in</td></tr>
</table>

level;	Section VI(B)(v). EDN also discloses providing indications regarding "multiple levels of low-battery warning." (Ex. 1007 at APP0336.)
[1g.] a battery low alert which occurs when the remaining time of charge in the battery is below a predetermined level but above the battery alarm level; and	Jenkins discloses **element 1g** for the reasons discussed in Section VI(A)(iv). Stich discloses **element 1g** for the reasons discussed in Section VI(A)(iv). Krohn discloses **element 1g** for the reasons discussed in Section VI(B)(v). EDN also discloses providing indications regarding "multiple levels of low-battery warning." (Ex. 1007 at APP0336.)
[1h.] display means for displaying the remaining time of charge in the battery.	As noted in Section IV(B), the Board should construe "display means" to be a means-plus-function limitation. Consistent with Baxter's position in the district court lawsuit, the Board should find that the function is displaying the remaining time of charge in the battery, and the structure disclosed in the '034 patent is an LCD. (*See* Ex. 1011 at APP0407.) Stich discloses **element 1h** for the reasons discussed in Section VI(A)(iv). Krohn discloses **element 1h** for the reasons discussed in Section VI(B)(v). EDN explains that the disclosed battery-energy gauge "are available...to the user, via an on-pack display" and that "[t]he percentage of full [battery] charge[] is often directly available on an LED or LCD." (Ex. 1007 at APP0333, 0336.) The battery-energy gauge thus allows a user to "know exactly how much charge is available from a battery pack." (*Id.* at APP0336.)
2. The infusion pump	As noted in Section IV(C), the Board should construe

of claim 1 wherein the monitoring circuit means further includes means for sampling the voltage and the current of the battery.	"means for sampling" to be a means-plus-function limitation. Consistent with Baxter's position in the district court lawsuit, the Board should find that the function is sampling the voltage and current of the battery, and the structure disclosed in the '034 patent is an analog-to-digital converter. (*See* Ex. 1011 at APP0411.) Stich discloses the elements of **claim 2** for the reasons discussed in Section VI(A)(iv). Krohn discloses the elements of **claim 2** for the reasons discussed in Section VI(B)(v). In the district court lawsuit, Baxter expressly asserted that LTC1325 disclosed this claim limitation. (Ex. 1011 at APP0409-0411 ("The analog to digital converter of the LTC1325 chip...samples the current or voltage[.]").) To the extent that these features of the LTC1325 chip fall within Baxter's claims, this claim limitation is disclosed or at least rendered obvious by LTC1325. (*See, e.g.*, Ex. 1008 at APP0338 (the chip "Measures Battery Voltage… with Internal 10-Bit ADC"), APP0352 ("[T]he average voltage across the sense resistor can be measured to determine the average battery load current.")
3. The infusion pump of claim 1 wherein the monitoring means further includes means for alternatively sampling the voltage of the battery and the current from the battery.	As noted in Section IV(D), the Board should construe "means for alternatively sampling" to be a means-plus-function limitation. Consistent with Baxter's position in the district court lawsuit, the Board should find that the function is alternatively sampling the voltage of the battery and the current from the battery, and the structure disclosed in the '034 patent is a switch that selects among analog inputs such as voltage and current. (*See* Ex. 1011 at APP0416.) Stich discloses the elements of **claim 3** for the reasons discussed in Section VI(A)(iv). In the district court lawsuit, Baxter expressly asserted that LTC1325 disclosed this claim limitation. (Ex. 1011

	at APP0414-415 ("The LTC1325 chip...contains a single ADC which must alternatively measure voltage and current....a control circuit (the Control Logic) [] alternatively selects between current and voltage.").) To the extent that these features of the LTC1325 chip fall within Baxter's claims, this claim limitation is disclosed or at least rendered obvious by LTC1325. (*See* Ex. 1008 at APP0344, 0346-0347.)
4. The infusion pump of claim 1 further including a battery low alert which occurs when the battery charge is below a predetermined level.	Jenkins discloses the elements of **claim 4** for the reasons discussed in Section VI(A)(iv). Stich discloses the elements of **claim 4** for the reasons discussed in Section VI(A)(iv). Krohn discloses the elements of **claim 4** for the reasons discussed in Section VI(B)(v).
9[a]. A method of infusing a liquid into a patient comprising:	*See **element 1a***.
[9b.] infusing the liquid into the patient by use of an electrically powered mechanism;	*See **elements 1b and 1c***.
[9c.] powering the electronically powered mechanism with a battery;	*See **element 1c***.
[9d.] monitoring the voltage of the battery;	*See **element 1d***.
[9e.] monitoring the current from the battery;	*See **element 1d***.
[9f.] determining from the voltage and the	*See **element 1e***.

current the remaining time of charge in the battery;	
[9g.] alarming when the remaining time of charge in battery is below a predetermined level;	*See* ***element 1f***.
[9h.] alerting when the remaining time of charge in battery is below a predetermined level but above the battery alarm level; and	*See* ***element 1g***.
[9i.] displaying the remaining time of charge in the battery.	*See* ***element 1h***.
10. The method of claim 9 wherein the step of monitoring the voltage of the battery further includes sampling the voltage of the battery.	*See* ***element 2b***.
11. The method of claim 10 wherein the step of monitoring the current of the battery further includes sampling the current of the battery.	*See* ***element 2b***.
12. The method of claim 9 further including the step of	Jenkins and Stich disclose the elements of **claim 12** for the reasons discussed in Section VI(A)(iv).

calculating the remaining minutes of charge left in the battery.	Krohn discloses the elements of **claim 12** for the reasons discussed in Section VI(B)(v).

VII. CONCLUSION

Because the information presented in this petition shows that there is a reasonable likelihood that the Petitioner CareFusion will prevail with respect to at least one of the challenged claims, CareFusion respectfully requests that a Trial be instituted and that claims 1-4 and 9-12 be canceled as unpatentable.

Respectfully submitted,

Dated: November 4, 2016

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PETITION FOR INTER PARTES REVIEW

OF U.S. PATENT NO. 5,764,034

Attachment A:

Proof of Service of the Petition

CERTIFICATE OF SERVICE

I hereby certify that on this 4th day of November, 2016, I caused a copy of this Petition, including all attachments, appendices, and exhibits 1001-1014, to be served in their entirety by electronic mail and Federal Express on the following counsel of record for patent owner:

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Dated: November 4, 2016

PETITION FOR INTER PARTES REVIEW

OF U.S. PATENT NO. 5,764,034

Attachment B:

List of Evidence and Exhibits Relied Upon in Petition

Exhibit #	Reference Name	Exhibit Page #
1001	U.S. Patent No. 5,764,034	APP0001-029
1002	File History of U.S. Patent No. 5,764,034	APP0030-232
1003	Declaration of Yangming Xu dated November 3, 2016	APP0233-242
1004	U.S. Patent No. 3,985,133 to Jenkins et al.	APP0243-278
1005	U.S. Patent No. 5,295,078 to Stich et al.	APP0279-296
1006	U.S. Patent No. 5,225,763 to Krohn et al.	APP0297-329
1007	Malcolm McClure, *Energy gauges add intelligence to rechargeable batteries*, EDN, May 26, 1994, at 125	APP0330-336
1008	Linear Technology Corporation, *LTC1325 Microprocessor-Controlled Battery Management System* (Copyright 1994)	APP0337-361
1009	Dieter Seitzer et al., Electronic Analog-to-Digital Converters, (John Wiley & Sons Ltd., c1983)	APP0362-375
1010	Baxter's original Complaint in Case No. 1:15-cv-9986 in the U.S. District Court for the Northern District of Illinois	APP0376-385
1011	Excerpts from Baxter's Initial Infringement Contentions in Case No. 1:15-cv-9986 in the U.S. District Court for the Northern District of Illinois, dated June 24, 2016	APP0386-435
1012	George Wood Vinal, Storage Batteries: A General Treatise on the Physics and Chemistry of Secondary Batteries and Their Engineering Applications, (John Wiley & Sons Ltd., c1940)	APP0436-444
1013	Anthony Ng et al., *LTC1325 Battery Management System Offers Unparalleled Flexibility*, Linear Technology Magazine, Oct. 1994, at 17	APP0445-477
1014	Anne Swager, *Smart-Battery Technology: Power Management's Missing Link*, EDN, March 2, 1995, at 47	APP0478-499

PETITION FOR INTER PARTES REVIEW

OF U.S. PATENT NO. 5,764,034

Attachment C:

Word Count Compliance Certificate

WORD COUNT COMPLIANCE CERTIFICATE

I certify that this brief conforms to the requirements of 37 CFR § 42.24(a)(1)(i) for a brief produced with a proportional font. The length of this brief, counted in compliance with § 42.24(a)(1) and relying on the word count of the word-processing system, is 12,408 words. This brief was prepared using Microsoft Word 2010 and the word processing program has been applied specifically to include all text, including headings, footnotes, and quotations for word count purposes.

By: / Kurt J. Niederluecke /
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Dated: November 4, 2016

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